

ARI Contractor Report 2001-04

Digital Skill Training Research

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13. ABSTRACT (Maximum 200 words): Constructivist training methods were empirically studied as a means for improving the acquisition and retention of digital skills. Using specially designed or adapted data collection instruments, data were gathered on soldiers trained at the TRADOC Military Intelligence (MI) and Field Artillery (FA) schools. Follow-up data were collected when trainees reported to their units. Skill data in raw form were delivered to ARI for statistical analysis. An additional major objective of this Delivery Order was to develop guidelines for assessing Distributed Learning (DL) methods/media based on a review of empirical studies conducted over the past five years. This DL Guidelines effort (Task 4 of this Delivery Order) is reported in a separate document, ARI Research Note 2001-09.				
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DIGITAL SKILL TRAINING RESEARCH

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INTRODUCTION

The Army Research Institute (ARI) is conducting a program of research aimed at the development of tools, methodologies, and techniques for enhanced training and retention of skills for computer use, or what are called digital skills. Wisher, Sabol, and Ellis (1999) summarize over 25 years of skill retention research and present useful information on the nature of skill memory, factors affecting retention of decision, knowledge, and execution skills, and “rapid train-up” interventions for addressing skill loss. Preliminary ARI research conducted at the U.S. Army Intelligence Center (USAIC) suggests that digital skills may have special characteristics and decay rates. Digital skill training improvements depend on identifying those tasks that are most likely to be forgotten. An ARI skill retention model (Hagman and Rose, 1983; Rose, Radtke, Shettel, and Hagman, 1985) can then be enhanced to accurately predict the retention of digital skills and recurrent training methods to refresh those skills that erode over time.

A second major area of interest is to help soldiers better achieve proficiency in acquiring and generalizing digital skills. It concerns finding ways to improve the training of digital skill proficiency, especially with respect to giving soldiers better approaches to handling the volume, complexity, ambiguity, and ubiquity of task-relevant information. The concept is to provide tools, methods, and research scenarios within existing courses using Army digital systems. One of the tools that holds promise for training improvements is that of constructivist training. This research was designed to assess the efficacy of introducing constructivist methods in the TRADOC classrooms.

TECHNICAL OBJECTIVES

A major objective of this delivery order was to gather empirical research data to calibrate the existing ARI Skill Retention Model for use with digital skills. This was accomplished by collecting and analyzing data from Army sites—Forts Huachuca, Sill, Hood, Campbell, and Bragg—where soldiers train on digital skills.

A second objective was to develop methods and guidelines for training soldiers to maximize their understanding of digital equipment to maintain high levels of situation awareness and respond to ambiguous situations in digital environments. Tools, methods, and research

scenarios were developed or adapted in the Military Intelligence (MI) and Field Artillery (FA) areas to accomplish this objective.

A final objective was to develop a preliminary tool for rating the effectiveness of various Distributed Learning (DL) methods/media in training skill/knowledge types. Army training developers could then use the tool to generate optimal DL environments for use in training digital as well as other skills.

SCOPE OF WORK

TRW performed five tasks under this delivery order. Following is a description of work activities performed in support of each task. Results will be generated from statistical analyses being conducted by ARI.

Task 1: Scenario, Exercise, and Evaluation Tool Development

The first task consisted of support in the areas of scenario and exercise development as well as test instrument adaptation. TRW developed and modified scenarios to support the constructivist training approach (Duffy and Cunningham, 1996) as well as digital skill retention research. Scenarios were designed to require soldiers to use the All-Source Analysis System (ASAS) and Advanced Field Artillery Tactical Data System (AFATDS) to gain command, control, communication, and information advantages on the battlefield, not to set up and operate the equipment. These scenarios provided a context for training soldiers to acquire and apply digital skills in response to changing and ambiguous situations. MI and FA subject matter experts (SMEs) modified existing scenarios or developed new ones that incorporate course objectives for training digital skills. At the MI school, this effort focused on the modification of existing course materials. Limited job aids and supplemental reference materials also were developed to provide examples or to establish standards for student performance. The scenarios were designed to place the student in a critical role in support of combat operations. The soldiers' analytical and digital skills were required for the production of tailored intelligence products to support ongoing or planned operations. MI scenarios were used in the classroom by school instructors and documented with situation and special event descriptions, maps, and other graphics to stimulate the need for students to respond to changing and ambiguous situations.

Working in teams with ARI and school SMEs, TRW developed procedures to assess scenario effectiveness both for meeting course objectives and for the purpose of research and

evaluation. For example, we developed questionnaires, surveys, tools, and tests to support training effectiveness evaluations. Evaluation tools were designed to employ a scenario-driven situation to better determine the soldiers' abilities to use the system in support of tactical operations. These tools included a General and Special Situation, the scenario with requirements and questions, an order-of-battle reference, a task-to-question correlation, and a partial solution. We revised lesson plans and evaluation instruments to support the constructivist training approach. TRW further modified scenarios and exercises to address concerns by senior school officials that initial constructivist approaches employed too much instructor involvement and too little analysis and self-learning by students. Appendix A includes representative MI and FA scenarios, job aids, and assessment tools developed for this task.

Task 2: Data Collection

In cooperation with ARI and Army personnel at the TRADOC schools, TRW collected and summarized MI and FA performance data on students and their instructors. TRW also provided inputs for I Brigade evaluations at Fort Lewis. Our SMEs worked with the primary instructors to review and modify the preliminary training assessment tool that we developed for the skill retention project. TRW assisted ARI in collecting performance data following training.

These data assessed soldiers' skill retention, and were collected on trainees in MI Analyst and FA courses at the above-mentioned sites. At all training test sites, we gathered the required data and entered them into the ASAS-Remote Workstation (RWS) and AFATDS databases. We completed testing of all students, scored exams, and submitted results to ARI. We also developed a data collection tool to examine skill retention and transfer for Interim Brigade Combat Team (IBCT) soldiers reporting to Ft. Lewis after training by the New Equipment Team (NET) at Ft. Huachuca.

We linked tasks to questions and developed or coordinated manual and visual scoring keys/solution sets to speed the grading process. Assistance was provided in data collection and organization to enhance the evaluation effort. We also assisted ARI in briefing the purpose and benefits of the constructivist model, and in training the instructors who would use the constructivist technique in the classroom. (See Appendix A for data collection instruments.)

Task 3: Performance Data Reduction and Analysis

Although TRW did not provide in-depth data analysis support, we did conduct rudimentary summary analyses to support skill retention and constructivist data collection as well as for the Distributed Learning Guidelines task. TRW provided assistance to ARI in analyzing the NET test results from Ft. Huachuca. An examination of skills used in duty positions indicated that the practice of associated job skills improved the soldiers' performance on the test. We constructed summary charts of the data showing relationships of tasks practiced on the job (task clusters) to overall retention rates. We also computed training transfer test scores at each site, summarized them, and provided them in raw form to ARI for further analysis.

For Task 4, data analyses took the form of basic descriptive and summary statistics for research included in the matrix of DL Guidelines. We also rated each matrix entry based on the degree and direction of treatment and control group statistical differences. Finally, we computed effect sizes where possible for the applicable studies. (See Appendix A for scoring and data reduction instruments.)

Task 4: Preliminary Distributed Learning Guidelines

Using ARI-provided technical reports and other papers, TRW developed a matrix that includes DL skill/knowledge characteristics (e.g., procedural, declarative, cognitive, leadership) along one axis and types of DL media (e.g., video, audio, computer-mediated) along the other axis. The matrix served as a tool for identifying preliminary guidelines for facilitating DL. After review of some 200 studies, 15 were selected for inclusion in the matrix. Studies that are empirical, recently conducted, and focused on training applications (vs. education) were given priority. Because some studies addressed more than one skill type, it was possible for them to be assigned to multiple cells.

We rated the effectiveness of the DL media for training various skill/knowledge types and computed effect sizes where possible. Ratings of effectiveness were linked to the statistical results reported using the following scale:

1. Learning outcomes statistically in favor of conventionally trained groups.
2. Learning outcome differences between DL and conventional groups not statistically significant.
3. Learning outcomes statistically in favor of the DL group.

Guidelines for training skill/knowledge types within distributed learning environments—the product of Task 4—are incorporated in ARI Research Note Number 2001-09, titled “Digital Skill Training Research: Preliminary Guidelines for Distributed Learning.”

Task 5: Document Research Procedures and Findings

This report is submitted to satisfy Task 5.

REFERENCES

Childs, J. M. (2001). Digital skill training research: Preliminary guidelines for distributed learning. (ARI Research Note 2001-09). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Duffy, T., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. Jonassen (Ed.), *Handbook of research on educational communications and technology*, 170-198. New York, NY: Macmillan.

Hagman, J. D., & Rose, A. M. (1983). Retention of military tasks: A review. *Human Factors*, 25, 199-213.

Rose, A. M., Radtke, P. H., Shettel, H. H., & Hagman, J. D. (1985). *User's manual for predicting military task retention*. (Research Product 85-26). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A163710).

Wisher, R., Sabol, M., & Ellis, J. (1999). *Staying sharp: Retention of military knowledge and skills*. (ARI Special Report 39). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

This Appendix contains a sample of data collection tools, scenarios, job aids, and scoring instruments developed or modified by TRW for use in the conduct of Tasks 1-3 of this Delivery Order.

APPENDIX A – PRODUCT SAMPLES

DOCTRINAL TEMPLATES

Doctrinal templates were used in support of Tasks 1 and 2 for the purpose of developing practical exercises and gathering digital skill retention data at the TRADOC schools. During the Intelligence Preparation of the Battlefield (IPB) process, analysts produced four templates—doctrinal, situational, event, and decision support. These Army templates help the analyst to deduce and analyze enemy capabilities, predict their most likely courses of action, identify information gaps, and predetermine locations, events, or critical elements for collection and targeting.

Doctrinal templates are depictions of an enemy force deployed for various types of operations without the constraints imposed by the weather and terrain. Information for the development of doctrinal templates comes from the study of a particular force and includes:

1. Tactics taught and practiced.
2. Observations and intelligence collected from training maneuvers and combat.
3. Writings of military leaders, historical documents, and instructional texts such as field manuals.

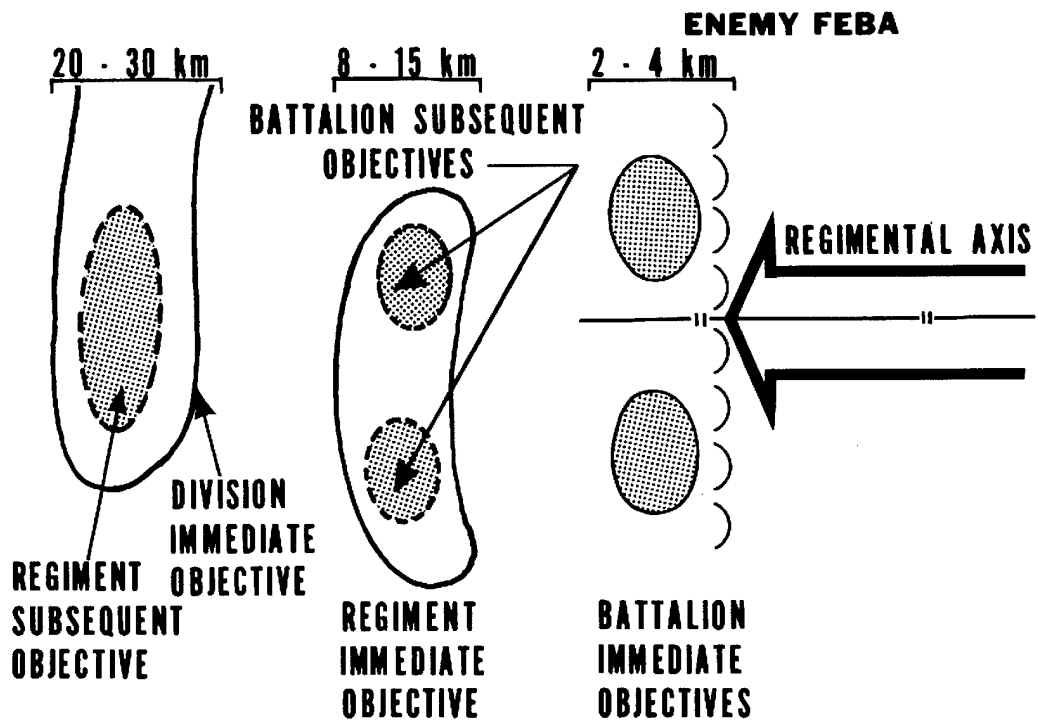
Composition of the force, formations, allocation of areas of operation or battle space, and frontages and depths of a force are considered. Additionally, weapons systems, unit equipment numbers, and force allocation methods such as norms or desired force ratios are considered.

Before creating or selecting a doctrinal template, the analyst should determine which enemy force or echelon of the force is the focal point for analysis. In conventional force operations, the commander normally is focused on one echelon above his own and includes depictions of enemy maneuver elements two echelons below that of the U.S. force conducting the analysis. An operations or unit matrix may assist in determining units, formations, battlefield functional systems, and operations to be templated.

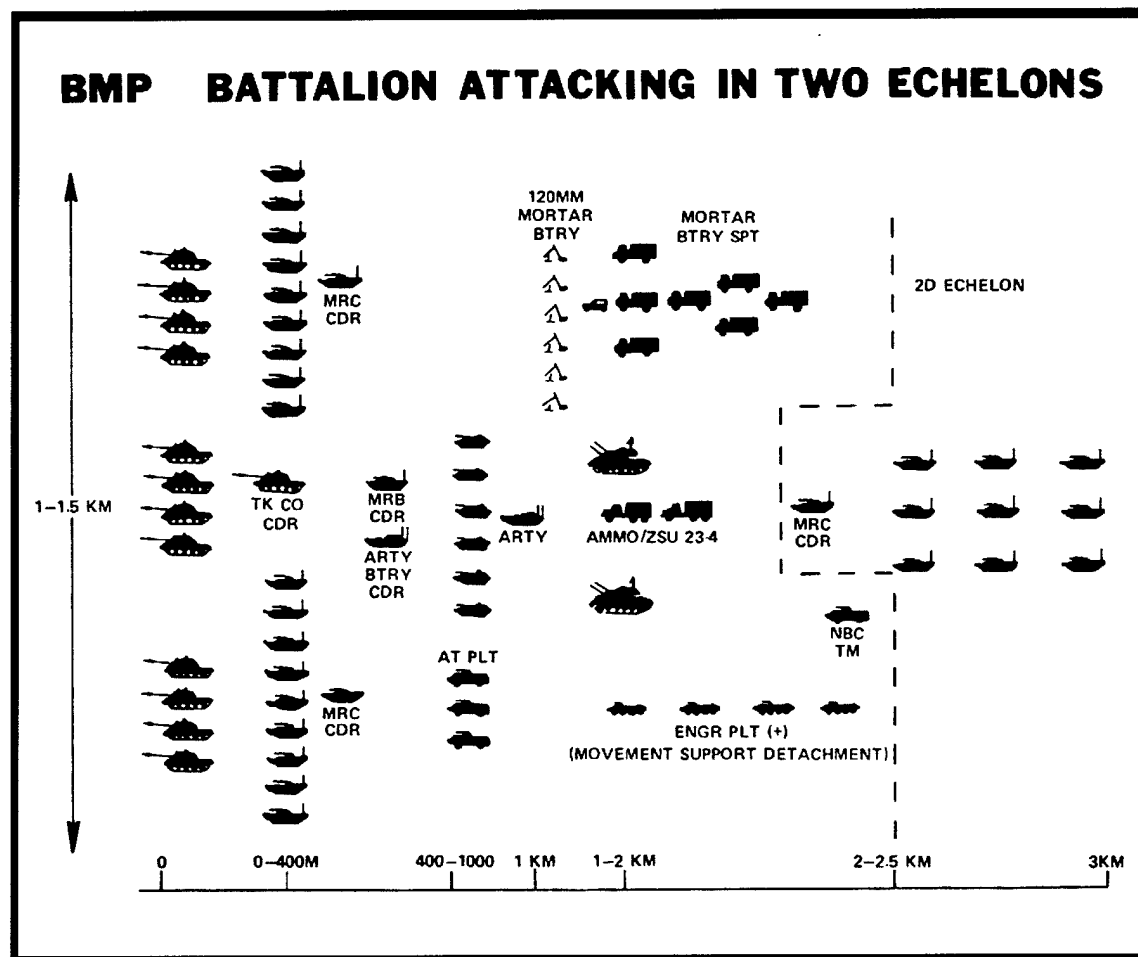
The attached diagrams provide a depiction of armored- and mechanized-based opposing force (OPFOR) planning guides and tactical formations. The OPFOR depicted will attempt to generate favorable force ratios at critical points on the battlefield of not less than 3:1 in tanks, 6:1 in artillery, and 4:1 in infantry to assure success of an attack.

Though our example uses heavy conventional OPFOR, doctrinal templates may be developed for stability and support operations (SASOs). Modes of operation for hostage seizures, bank robberies, and convoy ambushes lend themselves to template development and may be used to support analysis, planning, and decision making.

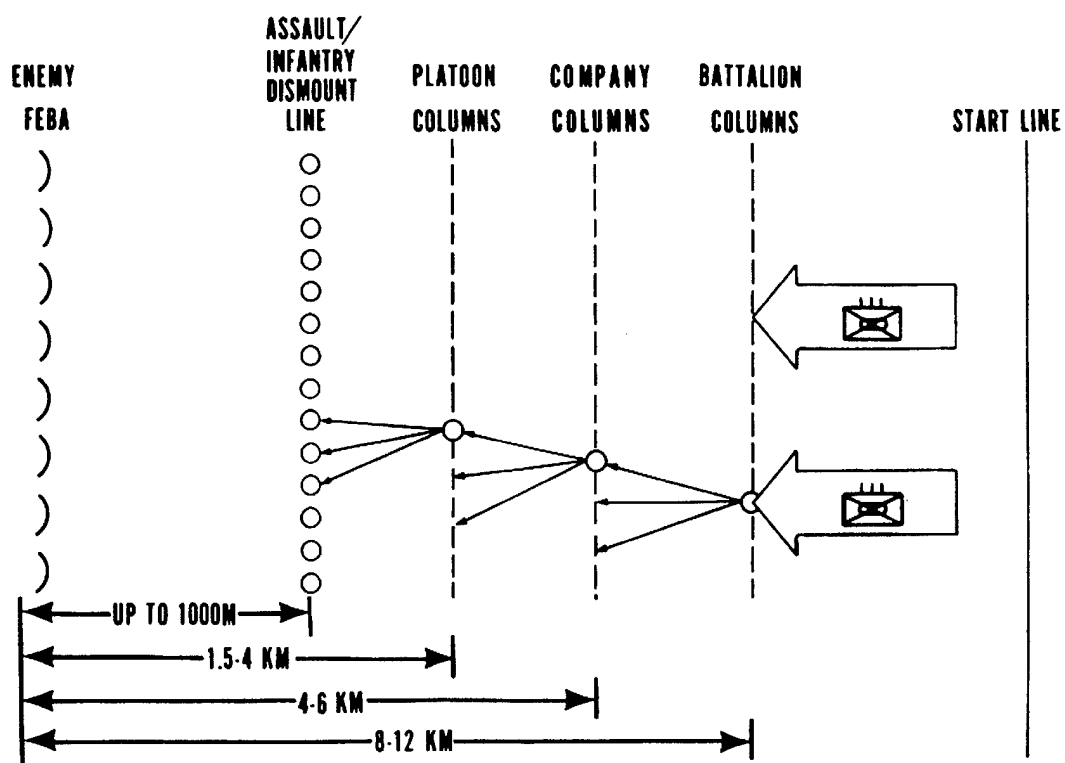
TACTICAL OBJECTIVES



BMP BATTALION ATTACKING IN TWO ECHELONS



DEPLOYMENT LINES FOR ATTACK



INSTRUCTOR NOTES

A single-page reference was developed as an instructor's aid for all of the Practical Exercises (PEs) that ARI used on instructional methods to enhance MI performance with digital systems.

GENERAL DIRECTIONS TO INSTRUCTORS

During this instruction the students will practice, apply, and continue to master skills learned during earlier blocks of instruction. Additionally, they will be introduced to and begin to employ and master the tools available to them through ASAS-RWS. The true power of the machine is that digital storage, processing, and communications free the military intelligence soldier to focus more of his capacities on the primary missions of analysis and collection, providing the commander and other consumers a more effective product. The more proficient that these soldiers are, the higher the quality of their product, and the better their retention of critical skills, then the more time and energy that their leaders and supervisors can dedicate to the mission.

Keeping this in mind, remember that the students are experiencing the "constructivist model" for the first time. Many are not experienced in group learning and problem solving. The first several hours will seem a bit confused. Here are some simple rules to follow:

- You are a training resource, but you should be the source of "last resort". Avoid the temptation to cave in and give them the answer(s). Help by identifying something else that they should try.
- Your introduction to this PE and the skills required to accomplish the requirements and tasks should be limited to the following:
 - A brief demonstration, if the materials are new.
 - Clarification of the situation or requirement.
 - Identification of resources available to assist.
 - Identification of a known skill, previous instruction, or related process. Crosswalk the ASAS-RWS process to something the student has done in a manual requirement.
- Limit your introduction, demonstration, and discussion to 25 minutes or less.
- Encourage working in teams.
- Observe from the rear of the classroom.
- Validate and clarify learning. A "good going, did you explain that to..." or a "I'm not so sure..." comment will help maintain focus, prevent exploration down a dead end path, and point students in the correct direction.
- Use the "here, let me show you" and "try this" techniques to enable frustrated students.

- Ask leading questions.
- Encourage students to work together toward solutions and let those who “know” show others. Let students brief segments of their solutions. They should demonstrate techniques used to accomplish the task or solve the problem.
- The PEs place the student and the problem or requirement in context. Keep it in context. He or she is performing a process or providing information that is essential to the mission.

DIRECTIONS TO INSTRUCTORS

MAP PRACTICE EXERCISE 1

Administrative Note: In this PE the students will learn the basic skills of using the map utilities and graphics package of the ASAS-RWS. These capabilities of the system should be related to knowledge and skills acquired earlier in the course and in ASAS instruction. Permit students to tell you what they know:

- Maps as a tool – IPB – Operations & Planning – Situational Awareness
- Map symbols – shapes – uses – colors – graphic representation
- IPB as a tool to support operations planning, analysis, and collection management
- The ASAS databases
- The communications capability of the ASAS system – as a part of the Army Tactical Command and Control System (ATCCS) – receive and process reports – disseminate information and reports.

Your introduction to this PE and the skills required to accomplish the requirements and tasks should be limited to the following:

- Demonstration of the map utility to select and open a map.
- Demonstration of enlarging the map to full screen.
- Demonstration of the map contrast tool.
- An orientation to the graphics pallet.
- Demonstration of creating, filling, and resizing an irregular object.
- Demonstration of the text edit tool for labeling.
- Selection and clearing of an object and text.

Limit your demonstration and lecture to 45 minutes or less.

Use the “here, let me show you”, “ask leading questions”, and “try this” techniques to enable frustrated students.

Encourage students to work together toward solutions and let those who “know” show others. Let students brief segments of their solutions.

NOTE: Since the MI school provided no written standard for the production or appearance of an MCOO, this document was developed from multiple sources to fill the void. Its purpose was to serve as a job aid and was designed to provide the details that would normally be found in a unit standard operating procedure to define the standards for production of an intelligence product. This document replaced the verbal instructions normally provided by the instructor and to minimize the disparity in products observed in previous classes. For example, avenues of approach were observed as being depicted in 10 to 12 ways in previous classes. Paragraph 14 of this procedure provides the standards for depicting an avenue of approach.

G2 OPERATIONS STANDARD OPERATING PROCEDURE (SOP) EXTRACT: MCOO

Administrative Note: The modified combined obstacles overlay (MCOO) is a product used to depict the battlefield's effects on military operations. It is normally based on map products, terrain studies, or imagery that depicts all obstacles to mobility. This extract will provide the techniques and procedures that could be used in an intelligence staff organization to assure the standardization and quality of products.

1. Place registration marks in both the upper right and lower left, or the lower right and upper left corners of the overlay or template.
2. Post the overall classification at the top and bottom center of the overlay, normally in large black letters. Generally, the MCOO will not be classified higher than SECRET and is never classified higher than the Operations Order (OPORD) or contingency plan it supports.
3. Develop a legend. The legend is normally placed in a separate corner of the overlay. The legend contains a description of all symbols used on the MCOO.
4. Title the overlay. The title is used to identify the individuals or headquarters preparing the overlay and is normally placed in the lower right corner of the overlay or template, and contains:
 - a. Map sheet name(s).
 - b. Map sheet number(s).
 - c. Map series(s).
 - d. Map scale(s).
 - e. Prepared by line.
5. Identify severely restricted terrain using GREEN or BROWN crosshatching on the overlay. This does not imply that movement through that area is impossible, only that it is impractical. Example of severely restricted terrain are minefields, unfordable rivers that exceed vehicle-launched bridge length, and road or railroad embankments. Terrain is considered severely restricted when it:
 - a. Will not support maneuver by the type of forces involved.
 - b. Will support maneuver only through the employment of highly unusual assets, or through a deviation from doctrine.

6. Identify restricted terrain on the overlay by outlining the area in GREEN or BROWN diagonal lines. Restricted terrain for armored or mechanized forces typically consists of moderate to steep slopes or moderate to densely spaced obstacles such as trees, rocks, or buildings. Swamps or rugged terrain are examples of restricted terrain for dismounted infantry forces. Terrain is considered restricted when:
 - a. Units have difficulty maintaining preferred speeds, moving in combat formations, or transitioning from one formation to another.
 - b. Terrain slows movement by requiring zigzagging or frequent detours.
7. Identify built-up areas larger than 1 square kilometer by BLACK crosshatch lines.
8. Outline river and water obstacles such as swamps, lakes, ponds, and canals in BLUE.
9. Designate key terrain by a circle with a "K" inside. PURPLE is recommended for showing key terrain, as the color stands out from the other colors normally used on the MCOO. Examples are:
 - a. A specific segment of high ground.
 - b. Sections of major highways or intersections.
 - c. Bridges.
 - d. Communications centers.
 - e. Sections of railroads or railroad junctions and intersections.
 - f. Airfields.
 - g. Industrial facilities.
10. Depict defensible terrain by outlining an oval circle around terrain that offers some concealment and cover to defending forces while also providing observation and fields of fire into potential engagement areas. Ideal defensible terrain is difficult to bypass, offers concealed and covered battle positions, covered withdrawal routes, and overlooks engagement areas that allow the defending force to use all of their weapon systems at their maximum ranges.
11. Depict engagement area by a target reference point in the center of the trap area or by prominent terrain features around the area. Engagement area is an area in which the commander intends to trap and destroy an enemy force with the massed fires of available weapons.
12. Depict counter-mobility obstacle systems (antitank ditch, minefields) in GREEN. Those obstacles planned for future emplacement by friendly units or those suspected within threat positions.
13. Depict obstacles such as roads and rail cuts, embankments, power lines, and overpasses in BLACK using the symbols found in FM 101-5-1.
14. Depict threat ground avenues of approach by drawing an arrow towards a likely objective. Each avenue of approach (AA) will be prioritized with the letters "AA" and a number. The number will indicate which AA is the best, and will be drawn in RED.

15. Depict threat mobility corridors (MCs) in RED. MCs are areas where a force will be canalized due to terrain restrictions. They allow military forces to capitalize on the principles of mass and speed and are therefore free of obstacles. MCs are prioritized with the letters "MC" followed by a letter.

16. Depict air avenue of approach (AAA) by drawing an arrow toward the objective. The tails of the arrow will cross approximately in the middle. Each AAA will be prioritized with the letters "AAA" and the number of the AAA will correspond with the ground avenue it is supporting.

NOTE: This is the ARI "final test" for ASAS-RWS. It was designed to evaluate all students, both the control and test groups. It was focused to assess student reaction to problem solving and ambiguous situations. The general and special situations are included within the text of the document.

START TIME: _____

FINISH TIME: _____

**ASAS – REMOTE WORKSTATION
INSTRUCTIONAL EVALUATION**

NAME: _____

CLASS NUMBER: _____

SSN: _____

INSTRUCTOR: _____

DATE OF EVALUATION: _____

Administrative Instruction: You may use notes, handouts, products created during class, and other reference materials that you may have. Use the assigned Remote Workstation (RWS) to answer the performance-related questions.

SITUATION: You are an analyst in the G2 Operations Section of the 2nd Infantry Division. On order, the Division is preparing to attack to destroy the 2nd Corps and mechanized elements massing to continue the attack. The Division will facilitate the passage of the 1st Cavalry Division and follow and support the 1st Cavalry Division. The friendly and enemy situations are as depicted in the previous exercises, the electronic database coordination (EDC) message, and updates and edits that you have made to the database.

The Corps Commander is basing the timing of the attack on three factors:

1. Movement and closing of the 1st Cavalry Division into attack positions behind the 2nd Infantry Division. The 1st Cavalry Division must be closed in these attack positions prior to the 2nd Infantry Division crossing the line of departure.
2. Containment and destruction of the Mechanized and Tank forces of the 815th and 820th Corps moving South to continue the attack. Of these forces, neutralization of the 5th Brigade, 815th Mechanized Corps, is critical to force the enemy to rethink assault river-crossing plans, timetable for his attack, and sequencing of forces into the attack.
3. The last and most critical factor of the Corps Commanders decision is the destruction or neutralization of missile and long range rocket and artillery massing to support the

continuation of the enemy attack or the defense. The 72nd Artillery Brigade and the 63rd MRL Brigade must be reduced to below 50% strength.

Your principal task will be to assist the Division G2 and G3 Operations Sections in tracking the status of preparations and information answering the commander's critical information requirements (CCIR) and the priority intelligence requirements (PIR). Battle damage assessments (BDAs) tracking will be an essential aspect of this task.

REQUIREMENTS:

1. The Division Air Force Liaison Officer (ALO) has reported to the G3 Operations Officer and the Fire Support Element (FSE) Chief that his flight of six F-16s have performed their egress on Air Corridor ALICE. They reported destruction of seven KOKSAN Guns and nine heavy trucks, with three major secondary explosions at 52SCS203857. Additionally, a battery of 6 probable 152mm towed guns and 18 trucks were struck due east of that location with Rockeye. Good target coverage with an estimate of heavy enemy casualties and all guns and trucks out of action.

A. What enemy units did the F-16s attack?

(1) _____

(2) _____

B. Determine the combat effectiveness of these units, update the database, and record your data below.

(1) _____ at _____ %

(2) _____ at _____ %

2. The Assistant Division Aviation Officer is briefing the G2 and G3 Ops Sections on their planned night mission to strike two elements of the 63rd MRL Brigade tonight at 2230 with one attack helicopter company (8 AH-64s). Due to the close terrain, the attack will use speed and stealth and employ the 30mm guns and the 2.75-inch rockets with the M261 HE Multipurpose Submunitions for area target attack. The aircraft will enter Air Corridor ROCK at 52SCS197658 and proceed at a speed of 100 knots (185 kmph) to 52SCS065792. They then turn on Air Corridor SNAKE and proceed at 81 knots (150 kmph) to Air Control Point (ACP) 4 at 52SCS180861. ACP 4 is the Release Point (RP). The Engagement Area (EA) LONE RANGER includes the enemy firing battalions at 52SCS199922 and CS211914.

Given the speeds and route, from the time that the attack company enters ROCK until it exits SNAKE at ACP4:

A. What distance, in kilometers, will the company travel? _____

B. What is the travel time from entry point to release point? _____ min. _____ sec.

3. Simultaneously, the Attack Battalion (-) will strike the lead elements of the 5th Brigade, 815th Corps in EA SLAM. The EA is bounded by 52SCS276862, 52SCS297872, 52SCS272802, and 52SCS292812. The battalion has selected battle positions along the west side of the EA SLAM. A platoon will occupy remote designation positions to laze targets for Hellfire missile engagements. These positions are selected around the EA to minimize dead space and increase kills. The remote designation positions selected are 52SCS286805 - RDP-1, 52SCS268857 - RDP-2, and 52SCS299861 - RDP-3.

The G2 Ops and Collection Manager are concerned about cross-cueing collection systems to providing early warning to the Attack Battalion and providing last-minute details on the probable target array in the EA.

A. Plot and label EA SLAM on an overlay in blue at 1:50,000 scale. Label the overlay with your last name and class number.

B. Plot, in yellow, and label the visibility from the three (3) remote designation locations using a hover altitude of 20 feet or 6 meters above ground level.

C. Save the graphic produced as an image file (your last name, first initial, and EA SLAM).

D. What are the actual (terrain) elevations for each remote designation position?

(1) RDP-1 _____

(2) RDP-2 _____

(3) RDP-3 _____

4. The Division Chief of Staff is concerned about the ability of the artillery regiments of the forward enemy divisions to influence the battle when the 2nd Infantry Division attacks. On a separate overlay and at 1:250,000 scale, plot the artillery regiments of the 21st, 23rd, and 25th Infantry Divisions of the 2nd Corps in red. Once located, plot the range fans of the longest range weapon system available in these regiments, the BM-21 multiple rocket launcher, in brown.

Have any subordinate firing battalions to these regiments been located? If so, plot these subordinate units to the overlay in the color magenta.

Save this graphic as an overlay (last name, 1st initial).

5. The I Corps attack helicopter battalion was returning from a deep attack and observed the emplacing of a minefield in the forward defensive area. The barrier was observed from 52SCS339816 to 52SCS345818 to 52SCS350824. The preparation of fortified line and defensive trench work was observed in the same area from 52SCS334818 to 52SCS338822. The time of the report is 16 May 00 at 1400.

Post this data on your map and save the map as an image file (your last name and first initial) and transfer the image to 1_BDE_TT.

Notify your instructor when you complete the evaluation.

NOTE: The following score sheet was developed to standardize and simplify scoring of the final practical exercise that reviewed the terminal learning objectives from the AFATDS course.

NAME _____

UNIT _____

**AFATDS
REVIEW EXERCISE TOOL SCORE SHEET**

PART I

REQUIREMENT 1.

Tasks: 061-300-5000: Prepare the TAFCS for Operations
061-300-5009: Perform troubleshooting procedures
061-300-5001: Configure the TAFCS Database
061-300-P001: Initialize the AFATDS
061-300-xx25: Restore Information Database
061-300-5004: Perform TAFCS Software Utilities Functions
061-300-5001: Configure the TAFCS Database

- 1a. Verify that the power cables and signal cables are properly connected. _____
- 1b. Verify that SCSI addresses and printers are set up correctly. _____
- 1c. Use the proper power-up sequence. _____
- 1d. Apply power to all components. _____
- 1e. Use the proper user ID and password. _____
- 1f. Properly insert the optical disk. _____
- 1g. Properly update the database. _____
- 1h. Select correct unit (CRNT FSE 3BDE 23CAV). _____
- 1i. Select correct unit's role (FSE). _____
- 1j. Set the correct workstation time. _____
- 1k. Activate the system. _____

REQUIREMENT 2.

Tasks: 061-300-5005: Update TAFCS Map Functions
061-300-P070: Maintain Current Terrain Data

- 2a. Center the map on grid (6 15500 034 56000 0 14). _____
- 2b. Set the map scale to (1:100,000). _____
- 2c. Establish the correct map mod (lower left 5 70001 033 90001 0 14). _____
- 2d. Select the correct datum (WGS 84). _____

REQUIREMENT 3.

Task: 061-300-P074: Maintain Current Map Data

- 3a. Did not open and display the SOP overlay. _____
- 3b. Create, display, and properly name a GEOMETRY overlay. _____
- 3c. Create, display, and properly name a 3rd BCT Ops overlay. _____
- 3d. Create, display, and properly name an Enemy overlay. _____
- 3e. Create, display, and properly name a Target overlay. _____
- 3f. Select all available and situation in view for all overlays. _____

REQUIREMENT 4.

Task: 061-300-5022: Update Master Unit List

- 4a. Import the new Master Unit List. _____
- 4b. Set the Master Unit List filter to display all systems types. _____

REQUIREMENT 5.

Task: 061-300-5002: Establish TAFCS Communications Configuration

- 5a. Name the new communications configuration FCX1. _____
- 5b. Establish networks and net channel settings as follows.
 - (1) Network Name: (BDE OPS FIRE). _____
 - (2) Protocol: (VMF). _____
 - (3) Media: (2-WIRE). _____
 - (4) Security: (SECURE). _____
 - (5) Local Address: (set to CRNT FSE 2 BDE 10). _____
 - (6) Data Encoding: (CDP). _____
 - (7) Data Rate: (32K). _____
 - (8) NAD: (Adaptive). _____
 - (9) Number Stations: (7). _____
 - (10) Station Ranking: (set to 1). _____

REQUIREMENT 6.

Task: 061-300-5006: Process Geometry Data in the TAFCS

- 6a. Change 3rd BCT's ZOR. _____
- 6b. Create new TF and BCT boundaries. _____
- 6c. Create and label the DIV CFL and X Corps FSCL. _____
- 6d. Establish correct effective times for the FSCL and CFL (systems time +4 to systems time +8). _____
- 6e. Create and label Objectives SAM, BILL, BRENT, RANDY, and JAMES. _____
- 6f. Create the contact points between 2nd and 3rd BCT and 3rd and 1st BCT. _____

REQUIREMENT 7.

Task: 061-300-5002: Establish TAFCS Communications Configuration

- 7a. Delete TF 1-10M from communications configuration. _____
- 7b. Add TF 4-85 AR to communications configuration. _____
 - (1) Establish route for TF 4-85 AR to primary/direct. _____
 - (2) Establish address as 90. _____
 - (3) Establish route for FIS as direct through TF 4-85 FSE. _____
 - (4) Establish correct addressees for all FIS. _____
- 7c. Save and label new configuration as FRAGO #1. _____

REQUIREMENT 8.

Tasks: 061-300-5007: Update Unit Data in the TAFCS

061-300-5006: Process Geometry Data in the TAFCS

- 8a. Create the two units. _____
- 8b. Use the correct grid location. _____
- 8c. Use the correct laser codes. _____
- 8d. Use the correct target location error. _____
- 8e. Use the correct max range. _____
- 8f. Use the correct left and right azimuths of search. _____
- 8g. Use the correct support relationships. _____
- 8h. Create NFAs covering both OPs with a radius of 500 meters. _____
- 8i. Create RFAs covering both OPs with a radius 2000 meters, with MLRS as the restriction. _____

REQUIREMENT 9.

Tasks: 061-300-5005: Update TAFCS Map Functions.

061-300-5006: Process Geometry in the TAFCS

061-300-5007: Update Unit Data in the TAFCS

- 9a. Create B 87 99th TAB. _____
- 9b. Use the correct grid location. _____
- 9c. Use the correct support relationships. _____
- 9d. Use the correct cueing agents. _____
- 9e. Use the correct direction of search (0400), left azimuth (6360), and right azimuth (0700). _____
- 9f. Change Max Range 1, Max Range 2, and Min range based on the location of the common sensor boundary. _____
- 9g. Create a call for fire zone that covers all of the 234th BAG location. _____
- 9h. Create an Artillery Target Intelligence Zone that covers all of the templated 235th BAG. _____
- 9i. Create critical friendly zones that cover all of Objectives SAM and BILL. _____
- 9j. Set max range 1 for the Q-36 to 18 kilometers. _____
- 9k. Set min range for the Q-37 radar to 23 kilometers. _____
- 9l. Display the range fans for both radars. _____

REQUIREMENT 10.

Task: 061-300-5021: Set Mission Critical List

10a. Set the new mission critical list. _____

REQUIREMENT 11.

Task: AFATDS Planning Functions

11a. Create the correct enemy template. _____

11b. Use the correct grid for the center location and the correct attitude. _____

11c. Display the template as a known enemy location. _____

REQUIREMENT 12.

Task: 061-300-5005: Update TAFCS Map Functions

12a. Display the range fans for both mortar units. _____

NOTE: The table below provides a crosswalk between test items (requirement) and terminal learning objectives (tasks) for ASAS-RWS.

FT. LEWIS ASAS-RWS EVALUATION 1
Requirement Task Key

<u>Requirement</u>	<u>Task</u>
1A	17. Center the Map 20. Plot a Database Entity
1B	4. Edit Database
2A	18. Determine a Point of Elevation
2B	15. Determine Field of View 11. Post Text to Map 22. Save an Overlay
3A	14. Determine Distance (irregular)
3B	6. Determine Rate of March
4A	14. Determine Distance (straight)
4B	10. Plot Range Fan 13. Use Draw Pallet 19. Change Map Scale 11. Post Text to Map 7. Save Image File
5	16. Change Map Scale 5. Plot/Create Entity 13. Use Draw Pallet 11. Post Text to Map 22. Save an Overlay
6	12. Convert Coordinates

These tasks cover all AIT listed tasks except 9. *Adjust Map Intensity*, 21. *Enlarge Map to Workspace*, and those tasks related to ASAS system communications.

NOTE: This sample of a practical exercise was developed for ASAS-RWS training.

U.S. Army Intelligence
Practical Exercise

ARI DB PE#1
ASAS-RWS
3 May 00

RWS DATABASE PE #1

Administrative Instruction: Work with your row group to determine how to complete the requirements. Perform the requirements individually to be sure that all group members can achieve them. Use your instructor as a learning resource, not a crutch. Raise your hand when your group requires assistance.

During this exercise you will perform duties as an Analyst in the Brigade S2 Section of the 2nd Brigade, 2nd Infantry Division. The Division Main Operations Center (DMAIN) has just completed relocation in preparation for an anticipated reinforcement and change of mission. The G2 at DMAIN experienced some communications problems prior to the jump. The G2 Operations NCOIC called about 20 minutes ago to inform the Brigade that the ACE is working to reduce the backlog and complete processing message traffic. The EDC was being delayed pending this processing and receipt of additional updates from I Corps LRS teams.

The EDC has been received.

REQUIREMENT 1.

Your NCOIC wants you to access and review the databases before you update any displays or products. The Graphic INTSUM for the battalions is not due for 2 hours, so you have 1 hour to complete the review tasks and provide the data for your NCOIC. Access the SITMAP table.

A. How many records are currently listed in the table? _____

1. Make a list of the data fields. With a short sentence or word or two define each data field. You may wish to set this aside for reference.
2. Draw a standard military map symbol. What data fields relate to the data fields used on these symbols?
3. How do these data fields and the others relate to information that you will use to determine order of battle factors, enemy activities, and unit strengths?
4. How can these data fields be used to assist your analysis and to determine probable courses of action?

Examine the data. Get together with your row group and discuss what the data represents. What information is most important in determining the enemies' strength?

B. Your NCOIC is proactive and wants to understand the “big picture.” Use the Division’s EDC to provide the information requested. (NOTE: Keep in mind that the SITMAP table contains the EDC from the Division and you are viewing records for the Division’s area of interest.) With your row group, plan how you will answer your NCOIC’s request. *Hint:* Use your field operators for the searches. Do each search individually from the whole list.

1. Fetch all regimental size units. How many records met your criteria? _____
2. How many records have allegiance of KN? _____
3. How many records have allegiance of EX? _____
4. How many units are “attacking?” _____

C. Your report has prompted additional questions in the mind of your NCOIC and he requests the following information:

1. Fetch all ARTY units. How many artillery units are reflected? _____
2. How many Mechanized Infantry Battalions are there? _____
3. How many CPs are there? _____
(If a command post is not identified for a unit what does it mean?)
4. How many Corps are identified on the battlefield? _____
5. Are there any apparent duplicate records or possible errors in the database? If so, what records may be errors? _____

With your row group, evaluate the method(s) that you used to answer the NCOIC’s questions. Was one better than the others? Why?

How does this additional information assist your NCOIC? How could he use it? Why would he want to know?

Brief your NCOIC on the results of your database review.

REQUIREMENT 2.

With an updated and clean database now on hand and a few minutes to spare, the S2 is reviewing the other intelligence requirement (OIR) files. The Brigade Fire Support Element had requested information on artillery units not assigned to 2nd Infantry Corps that are capable of supporting operations in the 2nd Infantry Division (U.S.) sector.

- A. Which artillery units are subordinate to the 20th Infantry Corps? _____
- B. How many self-propelled artillery units are listed in the database? _____

C. In anticipation of a mission change, the S3 Battle Captain is assembling the data needed for war gaming and force ratio determination. You are about caught up and your NCOIC tells you that you have a choice: go refuel and check the generators or pull up the data for the S3. SP4 Murray, your shift mate, grabs his rifle and helmet then speeds out the blackout curtain.

Your guidance for the S3 requirement is: Pull (fetch records) for all battalion-sized units, display the report, and index it on parent unit number in ascending order. Notify your NCOIC (instructor) for his review when finished. Remember that your NCOIC wants to understand what the data means. Do you think that he will want to analyze this information? How will this information be used by the S3?

REQUIREMENT 3.

The S2 has almost cleaned out his OIR file. In preparation for a situation briefing for the Brigade Commander and a newly assigned Battalion Commander, your NCOIC is updating the order of battle displays on the S2 wing of the S2/S3 Situation Map. (These are the same images that you have in your paper order of battle reference file.) Using the search tools and capabilities of the ASAS-RWS, provide the following data:

- A. What units are identified as subordinate to the 21st and 23rd Infantry Division, 2nd Infantry Corps?
- B. What infantry divisions have been identified?
- C. What artillery battalions have been identified?
- D. Which artillery battalions are identified as in position and could be ready to fire? What other status or activity indicators could artillery units have? Keep in mind that most artillery units train to execute "hip shoots" or emergency fire missions from the march.
- E. The S2 just spoke to the ASPS Chief at 2nd Infantry Division. Based on varied source reports and BDA, all regiments of all divisions subordinate to 2nd Infantry Corps are assessed as being at or below 27% strength. The I Corps G2 concurs with this assessment. Modify your database to reflect this significant combat power assessment.

Consult with your row group and determine how each of you answered the questions to provide the information for the briefing. Was there any way that was better than another? Why?

Examine the information that you provided your NCOIC. Why is this data important? How can it be used? Provide a briefing to your NCOIC (showing the results of your queries and the database change). Does your NCOIC agree with your assessment?

Note: SP4 Murray just returned covered with grease all over him. The NCOIC had him change the oil on both generators since he was so quick to volunteer. He wants you to show him a little more about ASAS-RWS.

NOTE: This sample of a practical exercise also was developed for ASAS-RWS training.

U.S. Army Intelligence Center
Practical Exercise

ARI Map PE#4
ASAS-RWS
3 May 00

RWS MAP PE #4 (NODE OPERATIONS)

Administrative Instruction: You may work with your neighbor and row group; however, individually perform all requirements. Raise your hand if you require instructor assistance.

REQUIREMENT 1.

During this exercise you will perform in the role of an Analyst in the Brigade S2 Section of the 3rd Brigade, 2nd Infantry Division. The Brigade TOC has just relocated to a hardened facility. Additionally, the Brigade has received a warning order from the 2nd Infantry Division.

The warning order indicates that I Corps and 2nd Infantry Division will conduct offensive operations to destroy the advancing elements the 815th Mechanized Corps and the 820th Tank Corps. The Brigade has been involved in close battle fight and defeating the attacking Divisions of 2nd Infantry Corps. The Brigade S2 wants to focus on the deep battle.

The Brigade XO is at the Division MAIN CP now and is returning with preliminary information on the new plan. Most details, however, are still being developed. The Brigade Commander is completing his inspection of forward defenses. Both will return to your location soon. The S2 is preparing to brief the Commander, XO, and S3 on the latest enemy situation.

Plot the SITMAP table (database). (NOTE: Ensure that symbol size is set to small. Scale in to 1:250,000 with the map centered at the coordinate CS280970.)

Can you read all of the symbols and labels?

What system capabilities or options can you use to improve visual clarity of the situation map?

List your ideas. What other techniques are available?

Once you have created an understandable and readable overlay or map product, notify the S2 NCOIC (your instructor). Be prepared to brief the techniques that you used to develop the product.

REQUIREMENT 2.

For this requirement you will be cast in the role of an analyst in the I Corps Artillery G2. To support the offensive operation, the Corps Artillery Commander desires to initially concentrate the deep attack capabilities of I Corps against concentrations of long-range, tube artillery and multiple rocket launchers that the OPFOR may be massing to support a breakthrough. The air defense systems positioned to protect these systems are also high value targets (HVTs).

The Corps will employ available tube artillery, MLRS, ATACMS, along with attack helicopters. Additionally, the Corps has been allocated Air Force and Naval tactical air sorties and Naval gun and missile fires.

The target program is being developed in the Corps Artillery TOC. It is critical that potential targets be identified and refined as rapidly as possible. Clear the map and plot the following units and equipment and answer the associated questions:

A. MRL Units

Which multiple rocket systems are available to units in the 1st CAA?

B. ARTY Units

Are any Artillery Groups apparent?

What artillery headquarters would most probably be positioned to provide command and control for a Corps Artillery Group (CAG) supporting the 2nd Infantry Corps?

What types of artillery systems are available in the 2nd Infantry and 815th Mechanized Infantry Corps?

C. Surface-to-Surface Missile (SSM) Units

Current weather and atmospheric conditions are essential for the accurate targeting of SSMs, rockets, and artillery. Radar activity may be an indication of SSM launch or artillery preparation. Has any meteorological radar activity been reported?

D. Surface-to-Air Missile (SAM) Units

The lack of air defense units identified in our area of operations indicates that the OPFOR has reduced active air defense radar emissions due to our effective targeting and electronic suppression. Under these circumstances, aerial surveillance and target acquisition radars operating in a safer environment may cue air defense firing units. Have any BAR LOCK, FLAT FACE, SPOON REST, or other early warning radars been reported?

Be prepared to brief your products and results to the Corps Artillery G2. (NOTE: Remember the lessons learned in the previous Requirement. Multiple overlays, variations in color, and map contrast changes may be required to develop a readily usable product.)

REQUIREMENT 3.

Great job! The briefing that your boss, the Corps Artillery G2, provided to the Corps Artillery Commanding General has helped focus the planning process. The Corps Artillery Commander has directed a detailed target value analysis (TVA) of Eujongbu, the lines of communication running through the town, and the artillery units located near the town. The Corps Artillery G2 has identified that the firing units of the 72nd Artillery Brigade and 63rd Multiple Rocket Launcher Brigade are HVTs for this operation. He is convinced that these elements present the greatest danger to success of the operation.

The I Corps G3, however, continues to be focused on maneuver forces, the advancing mechanized brigades of the 815th Corps. He is convinced that these units are the priority high-payoff targets (HPTs). He wants these units to receive the highest priority for targeting and destruction.

Your mission is to develop a simple graphic for the Corps Artillery Commander to brief the I Corps CG.

Your NCOIC has provided the following guidance. Center a map at Eujongbu at 1:500,000, scale. Draw a circle showing a 30 km (approximate) radius from the center of Eujongbu. Plot range fans for the ARTY/MRL units in the CAG forming to the northwest of Eujonbu.

Your NCOIC wants to see your work when completed. The Corps CG will be in your TOC in 30 minutes.

(NOTE: You may use overlays and data from the previous requirements. Use the overlay and map techniques that will provide the best visual product. Keep it simple. The Corps Artillery Commander wants the graphic [picture] to say it all.)

APPENDIX B – ACRONYMS AND ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

AA	Avenue of Approach
AAA	Air Avenue of Approach
ACE	Analysis and Control Element
ACP	Air Control Point
AFATDS	Advanced Field Artillery Tactical Data System
AIT	Advanced Individual Training
ALO	Air Force Liaison Officer
AR	Armor
ARI	Army Research Institute
ARTY	Artillery
ASAS	All-Source Analysis System
ASPS	All Source Production Section
ATACMS	Army Tactical Missile System
ATCCS	Army Tactical Command and Control System
BAG	Brigade Artillery Group
BCT	Brigade Combat Team
BDA	Battle Damage Assessment
BDE	Brigade
CAA	Combined Arms Army

CAG	Corps Artillery Group
CCIR	Commander's Critical Information Requirements
CDP	Conditioned Diphase
CFL	Coordinated Fire Line
CG	Commanding General
CP	Command Post
DL	Distributed Learning
DMAIN	Division Main
EA	Engagement Area
EDC	Electronic Database Coordination
EX	Confirmed Enemy Hostile Force, Affiliation Unknown
FA	Field Artillery
FIS	AFATDS Acronym for a Company Fire Support Team
FM	Field Manual
FRAGO	Fragmentary Order
FSCL	Fire Support Coordination Line
FSE	Fire Support Element
G2	Intelligence Staff at Corps and Division
G3	Operations, Plans, and Training Staff at Corps and Division

HPT	High-payoff Target
HVT	High Value Target
IBCT	Interim Brigade Combat Team
ID	Identification
INTSUM	Intelligence Summary
IPB	Intelligence Preparation of the Battlefield
KN	Korea (North)
LRS	Long Range Surveillance
Max	Maximum (usually associated with range)
MCs	Mobility Corridors
MCOO	Modified Combined Obstacles Overlay
MI	Military Intelligence
MLRS	Multiple Launch Rocket System
MRL	Multiple Rocket Launcher
NAD	Net Access Delay
NET	New Equipment Training
NCO	Non-Commissioned Officer
NCOIC	Non-Commissioned Officer in Charge
NFA	No Fire Area

OIR	Other Intelligence Requirement
OPFOR	Opposing Force
OPORD	Operations Order
OP	Observation Post
PE	Practical Exercise
PIR	Priority Intelligence Requirements
Q-36	Type of Counter-Battery/Counter Mortar Radar
Q-37	Type of Counter-Battery/Counter Rocket/Missile Radar
RFA	Restricted Fire Area
RP	Release Point
RWS	Remote Workstation
S2	Intelligence (Office/Officer) (US Army)
S3	Operations and Training (Office/Officer) (US Army)
SAM	Surface-to-Air Missile
SASO	Stability and Support Operation
SCSI	Small Computer System Interface
SITMAP	Situation Map
SME	Subject Matter Expert
SOP	Standard Operating Procedure

SSM	Surface-to-Surface Missile
SSN	Social Security Number
TAB	Target Acquisition Battery
TAFCS	Tactical Automated Fire Control System
TF	Task Force
TOC	Tactical Operations Center
TVA	Target Value Analysis
USAIC	U.S. Army Intelligence Center
VMF	Variable Message Format
WGS	World Geodetic Study
XO	Executive Officer
ZOR	Zone of Responsibility